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Experimental Study of the Parity Violating Hadronic Weak Interaction

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The study of the Hadronic Weak Interaction, and particularly of the stangeness-conserving HWI between nucleons, is of interest for several reasons: Some of the phenomena observed in the strangeness-changing HWI cannot be explained in terms of the symmetries of QCD, which opens the possibility for a non-trivial QCD dynamical process that is either related to the presence of the strange quark, or is a more general process that also affects light quarks; measurement of weak amplitudes in the $\Delta S = 0$ sector could discriminate between the two possibilities. The $\Delta S = 0$ HWI is also perhaps the only via to study weak neutral currents at low energies, and constitutes a probe for quark-quark correlations in nucleons. At low energies, using an Effective Field Theory approach, the nucleon-nucleon HWI can be parameterized in terms of five weak transition amplitudes involving S and P waves. There is a program to determine these weak amplitudes through the measurement of PV observables in few-nucleon systems in experiments that make use of low-energy neutron beams at the ORNL Spallation Neutron Source (SNS) and the NIST Center for Neutron Research (NCNR). Also other type of studies, like the measurement of PV in the deuteron photo desintegration are a future possibility. I will present an overview of several experiments (NPDGamma, n-^{3}He and Neutron Spin Rotation) that are part of this program.

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